

3.10 **Discharge Branch**

Discharge branch pipe upto the terminal point under this specification shall be flanged and bolted and shall be complete with gaskets, nuts and bolts of shall screwed as specified in data specification sheets. The standard length of the discharge branch pipe pieces shall be dictated from the consideration of case in dismantling and handling.

3.11 **Suction Branch**

A dismantling joint will be provided at the pump suction, as such, the pipe assembly will be subject to an additional thrust. This thrust loading is to be transmitted to the foundation bolts of the pump assembly.

3.12 **Pump Motor Supports, Base Plate etc.**

The pumps and motors shall have separate supporting arrangements. The pumps & motors shall be supported on the foundation work.

3.13 **Hydraulic test at shop**

All pressure parts shall be subject to hydraulic testing at a pressure of 150% of shut off head or 200% of rated head (effective head) whichever is higher, for a period not less than 30 minutes.

Performance test are to be conducted to cover the entire range of operation of the pumps. These shall be carried out to a span of at least 125% of rated capacity upto pump shut off condition. A minimum of five combinations of head and capacity are to be achieved during testing to establish the performance curves including the design capacity points and the two extremities of the Range of operation specified.

Tests shall preferably be conducted with actual drive motors furnished.

Reports and test certificates of the above tests shall be submitted to the Engineer-in-charge for approval of the employer.

All rotating components of the pumps shall be subjected to dynamic balancing tests, if specified in Data Sheets.

3.14 **Performance test at shop**

Each pump shall have to be tested to determine the performance curves of the pumps. These tests are to be conducted, in presence of Employer or his representative, as per the requirements of the Hydraulic Institute Standard/ASME Power Test Code PTE 8.2/BS-599/ S.S., latest edition.

The Contractor shall conduct necessary sump model test for establishing optimum sump dimensions/flow correcting devices and establish the suitability of suction conditions.

The Employer or his authorised representative shall be given full access to all tests. Prior to performance tests, the Contractor shall intimate the Owner allowing adequate time so that if the Employer so desires, his representatives can witness the test.

4. **PERFORMANCE GUARANTEE, TOLERANCE AND PENALTIES**

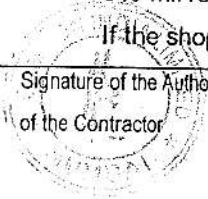
Performance Guarantee and Tolerance

The Bidder shall guarantee the effective head at the specified designed capacity and also the corresponding pump efficiency, pump input power, unless otherwise mentioned, the Bidder shall specify the allowable tolerance considered by him on the guaranteed performance, which shall not be more than those specified under clause relevant specification.

Rectification of Deficient Performance

The tenderer shall indicate the guaranteed efficiency of the pumps offered by him. While carrying out shop performance tests, the permissible limits of errors in measurement shall be in conformity with Class-B of BS:599 without any penalty whatsoever. Apart from that a negative tolerance of maximum (-) 3% on quoted efficiency shall be acceptable only with penalty. Variation more than (-) 3% will render the pump liable to rejection.

If the shop performance tests indicate any failure of the pump to achieve the guaranteed efficiency,



Signature of the Authorised Person of the Contractor

Chief Executive Officer

Guwahati Metropolitan Development Authority

304

169

Chief Executive Officer
Guwahati Metropolitan Dev. Authority

Handwritten signature and illegible text at the bottom left.

the Contractor will be given a time, to be decided by the Owner, to make up the deficiency at his cost by incorporating necessary modification, alteration and replacement.

5. **CLEANING, PROTECTION AND PAINTING**

Cleaning before shipment

Surface of all parts shall be cleaned to remove scale, dirt, oil, water, grease and other foreign objects prior to final assembly of the equipment. All openings shall be covered to guard against damage and entry of foreign objects.

Painting

All surfaces shall thoroughly be cleaned in a manner approved by the manufacturer for necessary paint coating to be applied on the surface. In case of any prevalent Standard/Codes on selection and application of painting/coating, the same shall be strictly adhered to.

The colour code for finished painting on the external surface shall be subject to Employer's approval. Necessary finish paintings including touch up paints, if not applied at shop, shall be done by the Contractor from sealed containers for site application.

Packing for shipment

All parts shall be properly boxed, crated or otherwise protected for transportation to suit the mode of transportation. Exposed finished surfaces shall be thoroughly greased before transportation.

6. **TESTS AND INSPECTION**

The manufacturers shall conduct all tests required to ensure that the equipment furnished shall conform the requirements of this specification and in compliance with requirements of applicable Codes and Standards. The particulars of the proposed tests and the procedures for the tests shall be submitted to the Employer for approval before conducting the tests. The pump is to be tested on the test bed at contractors' workshop in presence of the Engineer's representatives. The all relevant cost of such inspection by two representatives of Development Authority has to be borne by the manufacturer.

Where stage inspection is to be witnessed by Employer in addition to above, the bidder shall submit to the Employer at the initiation of the contract, the deadline of PERT-CHART showing the manufacturing progress and indicating the periods where inspection of the Employer or his authorised inspection agency is required at the manufacturers premises.

Since stage inspection is to be witnessed by Employer, the various stages of inspection, together with the programme shall be submitted to the Employer. The inspection and test procedures shall also be submitted for Employer's approval.

7. **EQUIPMENT AND SERVICES TO BE SUPPLIED BY THE AUTHORITY**

The authority shall supply the following:

Power at a distance of 200mt. from the proposed Pump house.

Reinforced Concrete Foundations at levels and sizes to be specified by the contractor.

Blanked flanges of dimensions and levels to be specified by the contractor, at the suction end.

SPECIAL TOOLS AND TACKLE

The Tenderer shall quote separately for a complete and unused set of all special tools, wrenches, etc. including tool boxes, specifying the quantum of requirement, for erection, maintenance, overhaul or complete replacement of equipment under this specification. A complete list of tools necessary shall be enclosed with the Proposal (See Annexure IV).

The Price quoted for tools, shall not be considered for evaluation of Tender.

SPARE PARTS

The tenderer is to supply required spare parts.

The spare parts as mentioned are to be supplied within the completion period of the contract.

Signature of the Authorised Person
of the Contractor

Page K - 5

Chief Executive Officer

Guwahati Metropolitan Development Authority

305

Chief Executive Officer
Guwahati Metropolitan Development Authority

Cost of spare parts as above is to be mentioned separately.

Replacement of spare parts during contract period would be borne by the Tenderer at their own cost. The tenderer is required to provide a list of spare parts for a period of two years for further maintenance.

DELIVERY

The schedule of the project demands early delivery of the equipments.

The delivery date shall be indicated by the Tenderer in the Progress Schedule (Annexure III) showing the time required for different phases of the work under the scope of this specification taking the date of issue of Letter of Intent as datum.

The Tenderer shall guarantee the delivery date subject to penalty.

8. **DRAWINGS, CURVES & INFORMATION REQUIRED**

Characteristic curves of pumps showing effective head, pump input power, efficiency, submergence/NPSH, against capacity ranging from shut off condition to at least 125% of rated capacity.

Speed Vs. torque curve of the pump corresponding to recommended mode of pump starting, super-imposed on speed Vs. torque curves of the motor, corresponding to 85%, 90%, 100% rated voltage and also extending over quadrant I & quadrant II covering reverse flow conditions, if applicable.

Diagram showing the type of lubrication system, etc.

Complete descriptive and illustrated literature on the equipment and accessories being offered.

Experience list for the similar type of equipment supplied, which should indicate name of customer, date of ordering, value of order date of commissioning, pump parameters and number.

A comprehensive write up or brochure on the details of manufacturing and test rig facilities in the shop of the manufacturer.

The successful bidder shall furnish the following drawings/data for Employer's approval after award of the contract.

All data furnished during bidding stage including details furnished under Clause 9.01.00 above shall be treated as final and binding on the Contractor if, however, any, minor change is essential during detail design stage for any improvement in the system, such changes shall be carried out only after obtaining approval of the Employer.

The GD2 valves of the impeller of the pump and Rotor of the motor at designed rpm are to be supplied.

9. **INSTRUCTION MANUALS**

a) The instruction manual shall present the following basic categories of information in a comprehensive manner prepared for use by operating and/or maintenance personnel :

- i) Instruction of Erection
- ii) Instruction for pre-commissioning check up, operation, abnormal conditions, maintenance and repair.
- iii) Write up on Controls and interlocks provided.
- iv) Recommended inspection points and periods of inspections.
- v) Schedule of preventive maintenance.
- vi) Ordering information for all replacement parts.
- vii) Recommendation for type of lubricants, lubricating points, frequency of lubrication and lubricant changing schedule.
- viii) Trouble Shooting Procedure.

Signature of the Authorised Person
of the Contractor

306

170

Chief Executive Officer
Guwahati Metropolitan Dev. Authority

- b) The information shall be organised in a logical and orderly sequence. A general description of the equipment including significant technical characteristics shall be included to familiarise operating and maintenance personnel with the equipment.
- c) Necessary drawings and/or other illustrations shall be included or copies of appropriate final drawings shall be bound in the manual. Test, adjustment and calibration information as appropriate shall be included and shall be identified to the specific equipment. Safety and other warning notices and installations, maintenance and operating cautions shall be emphasized.
- d) A parts list shall be included showing part nomenclature, manufacture's part number and/or other information necessary for accurate identification and ordering of replacement parts.
- e) Instruction manual shall be securely bound in durable folder.
- f) If a standard manual is furnished covering more than the specific equipment purchased, the applicable model (or other identification) number, parts number and other information for the specific equipment purchased shall be clearly identified and highlighted. Sectional drawing to suitable scale and characteristic curves for the particular equipment supplied must be included in the Instruction manual.
- g) The Instruction Manual shall include the list of spare parts that are required for 2 years normal operation and maintenance for equipment. It shall also include list of all special tools and tackle furnished with complete drawings and instructions for use of such tools and tackles.
- h) The instruction manual shall need approval of Employer in the same fashion as that for drawings.

DEVIATIONS

The Tenderer is required to submit with his proposal a detailed list of any and all exceptions taken to this specification by filling up the Deviations Sheet. In absence of such a list it will be understood and agreed that Tenderer's proposal is based on strict conformance to the specification in all respects. These requirements, however, are not intended to prohibit Tenderers from offering alternate quotation for equipment which they consider to be equal or superior to that specified for the intended service and for which he believes he can show economic and/or technical advantages, provided that he is not allowed to add to the Vendors list and is confined to items not appearing therein.

10. PROPOSAL DATA

To complete the proposal, the Tenderer must fill up the form sheets as per instructions given in the Tender Documents.

Each Tenderer shall supply the data requested in Proposal Data paragraph as above by typing in appropriate places on each page. These filled in data sheets must be properly signed by authorised representative of the Tenderer or Manufacturer as verification of the data submitted. These signed pages, in their entirety, shall be returned with and shall be part of the Tenderer's formal proposal. The Tenderer shall completely fill in the above information required for each of the above mentioned sheets. Failure to comply with this requirement may result in the rejection of the tender.

11. FOREIGN EXCHANGE AVAILABILITY

If any foreign exchange is required by Tenderer, it will have to be arranged from his own arrangement.

Signature of the Authorised Person
of the Contractor

Page K - 7

Chief Executive Officer

Guwahati Metropolitan Development Authority

307

Chief Executive Officer
Guwahati Metropolitan Development Authority

CHECK LIST OF THE PUMPS BEING OFFERED

GENERAL

Manufacturer :
Model No. :
Type of Pump :
Non Pullout : Yes/No
Impeller Type : Closed/Semi
No. of Pumps offered :
Efficiency of Pump at peak flow condition :
Efficiency of Pump at medium flow condition :
Efficiency of Pump at lean flow condition :

PERFORMANCES

Guaranteed capacity - M³/hr in peak flow without tolerance :
Guaranteed head (total bowl head) - MWC at peak flow discharge, without tolerance :
Guaranteed bowl efficiency in peak flow/head, without tolerance :
Guaranteed Pump efficiency, without tolerance in peak head/flow :
Input to the Pump (KW) in peak head/flow without tolerance :
Pump input power at worst operating condition on the range of operation (without positive tolerance) :
Pump input power at shut off :
Range of operation of Pump :
Recommended Motor KW :
Capacity in M³/hr in medium flow condition (specify tolerance limit) :
Head in MWC in medium flow condition (specify tolerance limit) :
Efficiency in medium flow condition (specify tolerance limit) :
Pump input KW in medium flow condition (specify tolerance limit) :
Capacity in M³/hr in lean flow condition (specify tolerance limit) :
Efficiency in M³/hr in lean flow condition (specify tolerance limit) :
Pump input KW in lean flow condition (specify tolerance limit) :

Signature of the Authorised Person
of the Contractor

308

171
Chief Executive Officer
Guwahati Metropolitan Dev. Authority

Pump rated speed (RPM) :

Pump specific speed of particular trim at D.P. :

Pump shut off head :

Minimum submergence required in MWC at worst flow condition :

PUMP NPSHR

-do- at highest water level condition :

-do- at lowest water level condition :

-do- in the operating range, without positive tolerance :

Pump duty : continuous/intermittent :

Pump shut off head :

FLEXIBLE JOINTS AND SHAFT

Flexible Coupling

Type :

Make :

Factor of Safety adopted :

Degree of Flexibility :

Extent of Play allowed :

Shaft diameter :

Material :

Factor of Safety adopted :

THRUST BEARING

Type :

Whether separate thrust bearing for pump motor provided or not :

Method of lubrication :

Whether the thrust bearing is capable for worst loading of both phases :

Axial thrust at duty point (kg) approx :

Whether thrust bearing temperature detector provided :

MATERIAL OF CONSTRUCTION

Impeller :

Head shaft :

Line shaft :

Pump shaft :

Coupling for pump Motor :

Shaft sleeve :

Discharge elbow, Motors Tool, Sole Plate :

Signature of the Authorised Person
of the Contractor.

Chief Executive Officer
Guwahati Metropolitan Development Authority

Shaft Sleeve

Seal Ring

Are the pumps suitable for parallel operation

Whether non-Reserve Ratchet is provided in pump or not

Type of lubrication for pump

Whether pre lubrication arrangement provided

EXPECTED LIVES UNDER NORMAL OPERATION AND MAINTENANCE

Impellers

Pump Bowl Casing

Shafts

Thrust Bearing

Flexible flotation hollow shafts and flexible coupling

Total Suspended length of pumps as measured from the motor floor level upto bottom of suction bell (mm).

Whether pump performance curve (H-Q, Q-P, Q-n, Q-NPSHR) authenticated by the pump manufacturer for both phases provided

Whether the copy of the pump family curve, authenticated by the pump manufacturer provided

Whether the system head curve superimposed with pump performance curve & modified performance curve provided

GENERAL

Are companion flanges, air release valves, sole plate, arrangement for thrust encoutring devices provided

Whether lifting lugs, eye bolts etc. provided load data

Weight of total pump assembly (empty)

Weight of total water column

Total Static Load

Total dynamic Load

Maximum horizontal back thrust at maximum water level condition

Maximum downward thrust

Maximum upward thrust

Signature of the Authorised Person of the Contractor

310

170
Chief Executive Officer
Guwahati Metropolitan Dev. Authority

Worst Moment due to maximum horizontal back thrust

**HORIZONTAL PUMP AXIALLY SPLIT CASE
DATA SPECIFICATION SHEET**

GENERAL INFORMATION

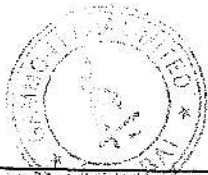
Service	Clear Water	Pump Type	Horizontal pump axially split case
Designation			
No of pumps Req'd.	Six (6) (Four (4) working Two (2) stand by)	Duty	Continuous
Pumps working in parallel	Yes/No	Location	Indoor

ELECTRICAL DOCUMENT

Electrical Motors Technical Specification Enclosed : Yes/No

SUPPLY OF ACCESSORIES AND SERVICE

Base Plate	Yes/No	Eye bolts, Lifting tackle etc.	Yes/No
Sole Plate	Yes/No	Vent and drain with isolation valves	Yes/No
Foundation bolts, nuts, sleeves nut	Yes/No		
Companion flanges at Pump		Universal Joint	Yes/No
Suction & Discharge nozzles along with nuts, bolts & gaskets	Yes/No	Thrust block req'd. Non reverse ratchet Not acceptable	Yes/No
External cooling/sealing/lubrication	Yes/No	Special Tools & Tackle Spare parts (for 2 years operation)	Yes/No
Cooling/sealing/lubrication system	Yes/No	Painting & Protective coating	Yes/No
Discharge pressure gauge	Yes/No	Suction side low level switch with annunciation hooter complete with accessories.	Yes/No
Suction pressure/VAC Gauge	Yes/No		
Pump Motor Coupling & Guard	Yes/No		



Signature of the Authorised Person
of the Contractor

Page K - 11

311

Chief Executive Officer

Guwahati Metropolitan Development Authority



Chief Executive Officer
Guwahati Metropolitan Development Authority

DATA SPECIFICATION SHEET

PUMP PARAMETERS

Design Capacity	Individual Pump of adequate equal capacity at a duty point of 600 m ³ /hr 45m head with 2 pumps in parallel operation at a time.	Permissible tolerance in design capacity	(±) 2.5%
Effective head (excluding loss in pump discharge branch pipe) at design capacity : Tenderer to indicate from the data supplied		Permissible tolerance in efficiency with penalty : Available submergence : (Tenderer to indicate)	(-) 3%
Discharge pressure :	MLC	Static head of pumping system	
Pump shut off head	Not exceed MLC	Frictional head of system at design capacity	
Range of operation : (Tenderer to indicate)	% to % of design capacity	Reverse flow through pump to be considered for motor selection	Yes/No
Maximum speed : (Tenderer to indicate)	within 750 RPM		
Only rising stable HQ characteristics throughout the 'Range of Operation' is acceptable	Yes/No		

LIQUID DATA

Liquid handled	Clear water	Chloride	39 ppm max
Specific Gravity	Nearly 1.0	Total hardness as CaCO ₃	144 ppm max
Temperature	10EC to 40EC	Chlorine	2 ppm
pH Value	7.3 to 8.6	Total dissolved solids	500 ppm max
Turbidity	5 NTU/ JTU (Max)		



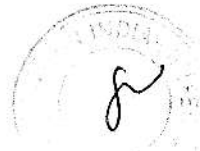
Signature of the Authorised Person of the Contractor

Chief Executive Officer

Guwahati Metropolitan Development Authority

312

172
 Chief Executive Officer
 Guwahati Metropolitan Dev. Authority



DATA SPECIFICATION SHEET

SPECIAL FEATURES

Type of Impeller	Closed/open/ semi-open	Location of thrust bearing	Both on pump motor
Type of Lubrication & Sealing	Self/external of the Tenderer to indicate	Thrust bearing to be designed for pump shut off operation	Yes for a period of Tenderer to indicate
Lubricant	Grease/oil/water		
External filtered water will be made available by		Type of coupling (Pump Motor)	Flexible Rigid
Authority for lubrication and scaling		Type of pump motor connection	Directly coupled Through intermediate shafts.
Shaft enclosing tube :	Yes/No	Max inside dia of Dismantling joint	Will be mentioned
Pump discharge branch pipe	Flanged	(supply by Authority for thrust block design	to successful bidder
Discharge head arrangement	As shown in M3/Hr	Pump drain	
Flange drilling standard	Tenderer to indicate	Air vent	1" BSP dia Pipe and valve to be provided at the highest point of the pump

**DATA SPECIFICATION SHEET
MATERIAL OF CONSTRUCTION**

Item	Specification	Item	Specification
Pumping casing	2.0% NCI, BHN 220-250	Shaft coupling	Pin type coupling
Casing Liner	Not applicable		
Impeller	S.S. CF-8M within 20% upper and lower range of family curve	Thrust bearing	Anti-friction bearing

Signature of the Authorised Person
of the Contractor

Chief Executive Officer

Guwahati Metropolitan Development Authority

312

Chief Executive Officer
Guwahati Metropolitan Dev. Authority

Wearing Rings	Bronze	Base Plate Sole Plate	M.S. with optical Finished M.S.
Impeller Shaft	EN-8	Fasteners in pump assembly Stuffing Box Gland Packing Fasteners	Carbon Steel Cast Iron Graphited cotton Carbon steel


DRIVING MOTOR

Item	Specification	Item	Specification
Drive motor by	Manufacturer	Price adjustment figures	For pump as per IPMA and for motor as per IGGMA formulae and indies
Motor Spec. as per :	Spec. no. E1	For addl. power	
Supply voltage	6 KV ± 10%		
Phase :	3 (Three)		
Frequency	50 Hz + 5%		
Type of enclosure	SPDP	Class of Insulation	F
Degree of protection	IP 44	Type of cooling (only air-cooled motors will be accepted)	Air cooled

**DATA SPECIFICATION SHEET
INSPECTION AND TESTING**

Item	Specification	Item	Specification
Stage inspection by owner :	Yes/No		
(Details of Stage Inspection by Owner to be added in due course)			
Material testing and Identification	Required/not required		

Signature of the Authorised Person
of the Contractor



Chief Executive Officer
Guwahati Metropolitan Development Authority

174 Chief Executive Officer
Guwahati Metropolitan Dev. Authority



RADIOGRAPHY

Radiography Required/not required
 Parts to be tested
 Testing Std.
 Acceptance Std

UL TRASONIC

Ultrasonic exam required / not required
 Parts to be tested
 Testing Std.
 Acceptance Std

DYE PENETRATION

D.P. Test Required/not required
 Parts to be checked
 Testing Std. Dia.
 Acceptance Std.
 Hydrostatic test reqd. Yes/No
 Dynamic balance of pump impeller Reqd./Not reqd.
 Performance test at shop to be witnessed Yes/No
 Performance test at shop reqd. at full speed Yes/No

MAGNETIC PARTICLES

M.P. Test Required not required
 Parts to be checked
 Testing Std.
 Acceptance Std.
 Hydro test to be witnessed Yes/No
 Dynamic balancing to be witnessed Yes/No
 Performance test reqd. for determining Head Vs Capacity HP Vs Capacity curve
 Sump model test at shop Reqd.

NOTES

1. Pump motor set to be designed for starting with discharge valve partly open/closed condition.
2. Motor cooling arrangement shall be self-circulation type having fans mounted on motor shafts.
3. For sealing/cooling water shall be tapped from the pump discharge.
4. Range of operation of the pumps shall be selected by the Tenderer shall also indicate the minimum water level at which pumps can be satisfactorily operated on continuous basis which should be same to the existing one. Tenderer shall furnish with his offer NPSH Vs capacity curve entire range of operation determine based on the above conditions and considering single pump operation, 2 pump operation and 3 pump operation.

Chief Executive Officer
 Guwahati Metropolitan Development Authority

Signature of the Authorised Person
 of the Contractor

Chief Executive Officer
 Guwahati Metropolitan Development Authority

315

Chief Executive Officer
 Guwahati Metropolitan Dev. Authority

SECTION - L
TECHNICAL SPECIFICATION FOR MOTORS
(GENERAL)

1. SCOPE

This specification covers the general requirements of the drive motors.

Motor shall be furnished in accordance with both this general specification and the accompanying driven equipment specification.

In case of any discrepancy, the driven equipment specification shall govern.

2. STANDARDS

All motors shall conform to the latest applicable IS/BS/DIN Publications. All the motors should be of ESF-1 category with an efficiency range of 96% and above.

3. TECHNICAL SPECIFICATION FOR DRIVE MOTORS

- 3.1 The drive electrical motor shall be of squirrel cage induction type horizontal axis to suit the size of the pump and shall be able to drive the pump. The rating of the motor shall be as specified of 6 KV \pm 10%, 3 Phase, 50 Hz \pm 5%, 1000 RPM (Synchronized) for main motors of raw water & clear water pumping.
- 3.2 The motor shall be designed for air cooled type auto transformer starting arrangement.
- 3.3 All the motors shall be rated for continuous duty operation (duty : S1). However, due to the operational schedule of the pumping station, the pump motor unit may demand for 8/10 start and stop in a day with a minimum time gap of 20 minutes for one stop after prolong operation and restart the same. The motor shall also be capable of one immediate hot restart and three equispaced starts per hour.
- 3.4 The motor KW rating have at least 20% margin over the maximum pump input at duty points or 10% margin over the maximum pump input in the worst case of operation whichever is higher. The overload capacity of the such selected motor rating shall be 10% continuous by allowing temperature rise limit to Class-F insulation. If the tenderer feel that the above rated motor is not satisfying stated loading. They may offer their rating of motor.
- 3.5 The motor characteristics shall match the requirements of the driven equipment.
- 3.6 The motor should deliver rated output and accelerate the full speed with permissible rated voltage at motor terminal. The accelerating time of the motor should not be more than 3 sec.
- 3.7 With rated voltage at motor terminal, the motor shall be capable of working satisfactorily at full load at least 5 minutes without injurious hearing or stalling. For 3% voltage imbalance in power supply, the motor shall not be de-rated more than 10%.
- 3.8 The locked rotor withstand time under hot condition at 110% rated voltage shall be more than motor starting time by at least 2.5 sec. Hot thermal withstand curve shall have a margin of at least 10% over the full load current of the motor to permit relay setting using motor rated capacity.
- 3.9 The motor shall be SPDP type having protection group of IP 44. Motor shall be suitable for rotation in both the direction.
- 3.10 The installation of the stator winding of the motor shall be of Class-F but the heat exchanging arrangement shall be such be that the temperature rise is limited to that of

Signature of the Authorised Person
of the Contractor

Page L - 1

Chief Executive Officer

Guwahati Metropolitan Development Authority

316


Chief Executive Officer
Guwahati Metropolitan Dev. Authority

Class-B as IS:325 over the ambient temperature. The ambient temperature may be considered as 45°C and the relative humidity may vary from 25% to 100%.

3.11 The motor stator shall be provided with 6nos. embedded 3-wire type PT-100 resistance temperature detector placed on suitable for spots to scan the motor winding temperature. The lids of the RTDs are to be brought out to a separate terminal box.

3.12 The rotor of the motor should be sturdy in construction so as to ensure trouble free operation as indicated in relevant clause without any rotor bar fracture inside or outside the rotor slots or rotor bar end brazing failure or development of cracks in the brazed joint of the rotor bar with shorting ring. The rotor bar of the rotor shall be 99.99% electrolyte grade Cu and shall be well machined, insulated tightly placed and evenly press fitted inside the rotor slots, the later being broached to have smooth finish. The rotor shall be slotted end ring design. The rotor bars in the form of temple bars shall be used. Proper brazing materials shall be used.

The rotor shall be dynamically balanced with all the fans and with key in the shaft extension.

The rotor must carry a guarantee of at least 20,000 starts as per the operations schedule mentioned in clause-6.02 without any rotor bar failure or any other type of rotor failure.

3.13 The motor shall be provided with anti-friction bearing, grease lubricated both at driving and non-driving ends.

The bearings shall be provided with seals to prevent leakage of lubricant or entrance of foreign matter like dirt, water etc. into the bearing area.

Grease lubricated bearings shall be pre-lubricated and shall have provision for on-service positive lubrication with drains and grease collectors to guard against over lubrication.

The type and number of bearing the lubricant details (limited to normally available types complex of IOC or, any standard make). Quantity and frequency of bearing lubrication should be clearly indicated in the offer as well as to be displayed in the rating plate of the motor.

PT-100 type temperature detector probes are to be provided both at driving and non-driving end bearings and the leads of the BTD's are to be brought out to a separate terminal box.

3.14 The motor should be smooth in operation and the noise level should not exceed 85 db at 1.5M from the motor. The vibration level of the pump and motor should be within the specified the limit of IS:11724 as indicated in clause 5.16 or equivalent.

The motor terminal box which shall be of detachable type and rotatable in steps of 90°. Shall have 6 nos. terminals each suitable for 2 nos. 3 core, 1.1KV cable of adequate size PVC Ar Al. For main motor feeding the terminal box shall be phase segregated type. The terminal boxes shall be with removable cover with access to connection. No compound shall be used in the terminal box for easy handling. The motor terminal boxes shall be furnished with suitable cable lugs and double compression brass glands to match with the cable size. The terminals shall be clearly identified by phase markings and termination indication corresponding to direction of rotation.

The maximum system fault current for a duration of 1.0 sec. shall be considered.

The motor shall be equipped with built-in anti-condensation space heater of adequate rating suitable for operation at 240V AC supply. Separate terminal box for the space heater connection are to be provided.

The frame of each motor shall be provided with two separate and distinct grounding pads suitable for accommodation of grounding conductors of suitable size Al flat. The main cable terminal boxes shall have separate grounding pads.

Signature of the Authorised Person
of the Contractor

Page L - 2

Chief Executive Officer

317 Guwahati Metropolitan Development Authority

Chief Executive Officer
Guwahati Metropolitan Dev. Authority

- 15 The rating plate of the motor should contain, the minimum information as indicated in the relevant IS /equivalent code. Apart from the same, the information as indicated in clause-6.13 as well as the temperature rise in °C under rated condition, method of measurement, degree of protection shall be furnished.
- 16 The tenderer should furnish with the offer the motor load-efficiency curve, torque-speed curve load-power factor curve, thermal withstand curve (hot and cold), current-speed curve and current-time curve.
- 17 The dimensional drawing of the offered motor, terminal box drawings, load data, GD² value of the drive unit and the driven unit shall also be furnished with the offer.
- 18 Apart from the standard accessories provided by the motor manufacturer and those accessories mentioned in preceding pages, one local lock switch is to be provided with each motor having proper connection with the motor connecting breaker so that the motor breaker can not be closed when the lock switch is in operation. The motor shall also be provided with suitable lifting lugs eye bolts having adequate provision for lifting installation.
- 19 The tests as per IS:325/ equivalent code shall be conducted to each motor. Temperature rise test are to be conducted to at least one motor. The motor vibration analysis shall be conducted mounting the motor on the job motor stool. All the above tests are to be conducted at the manufacturer's shop in presence of the departmental representatives. Apart from the shop testing, normal field testing are to be carried out during installation, pre-commissioning and commissioning. All necessary arrangements for the tests are to be made by the contractor.

CHECK LIST OF THE MOTORS BEING OFFERED - As per Motor Data Sheet provided in Section

TESTS

Upon completion, each motor shall be subjected to standard routine tests as per I.S./ equivalent code. In addition, type test of at least 3 nos motors as per choice of the customer, shall be performed. Further any special tests called for in the driven equipment specification shall be performed. The manufacturer/tenderer has to bear all expenses for such testing to witness the tests for max. two representatives of GDD to the manufacturers premises.

Six (6) copies of routine test certificates and type test certificate shall be submitted for approval prior to the dispatch of the motors from the manufactures factory.

SPARES

Two years spare parts are to be supplied as specified separately. Recommended spares for five (5) years operation shall be quoted along with the bid clearly identifying the part nos. with recommended quantities.

DRAWINGS, DATA & MANUALS

Drawings, data & manuals for the motors shall be submitted as indicated below :

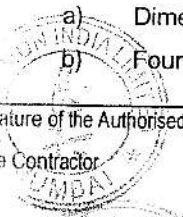
Along with the bid :

- a) Individual motor data.
- b) Type test report.

After Award of the Contract for Approval :

- a) Dimensional General Arrangement Drawing
- b) Foundation Plan & Loading

Signature of the Authorised Person
of the Contractor



[Handwritten Signature]

[Handwritten Signature]
Chief Executive Officer
Guwahati Metropolitan Development Authority

- c) Cable end box details
- d) Space requirement for rotor removal
- e) Thermal withstand curves hot & cold
- f) Starting and speed torque characteristics at 80% & 100% voltage
- g) Complete motor data
- h) Erection & Maintenance manual.

Chief Executive Officer
Guwahati Metropolitan Development Authority

Signature of the Authorised Person
of the Contractor

Page L - 4

Chief Executive Officer

Guwahati Metropolitan Development Authority

310
Chief Executive Officer
Guwahati Metropolitan Dev. Authority

SECTION - M

TECHNICAL SPECIFICATION FOR OTHER ELECTRICAL APPLIANCES

(This specification is indicative type. Successful bidders are required to design full electrical system by them and obtain approval before supply & erection)

1.0 H.T. Switch Gear

The offer of the tender shall include complete design of the H.T. switch gear, current transformer ratio, size of the incoming cable, size of outgoing feeder cable for motor, transformer etc. The cable entry boxes at the near end of H. T. breaker and the terminal box of the motor should be designed according to the size of the cable offered in the tender. The capacity of the incomer H.T breaker, outgoing feeder breaker and bus bars should be specified in the tender.

The H.T. Switch gear shall be of 6.6 KV, 250MVA indoor vacuum circuit breaker, 400A/800A single/double break, trip free horizontally mount, vertical/horizontal isolations complete with solenoid closing mechanism and anti pumping relay. The solenoid closing mechanism shall be suitable for 110 Volt DC.

The VCB shall be mounted on a brake carriage complete with self contained manually operated fully interlocked, raising the lowering mechanism with integral earthing and circuit earthing. The operating mechanism shall normally be operated from remote electrical control but arrangement should also be made for local electrical control. Mechanical device shall also be provided on the breaker for manually tripping and closing. Each set of the circuit breaker shall have the following features:

- a) 1 set mechanical ON & OFF indicator
- b) 1 rear entry cable box with glands suitable for 11 KV XLPE cable.
- c) 1 set of indicating lamp Red & Green.
- d) 3 current transformers of suitable ratio and accuracy class shall be provided
- e) 2 shunt trip coils rated for 110 VDC.
- f) 1 Space heater with ON & OFF switch.
- g) 1 suitable label.
- h) Local/Remote selector switch
- i) Auxiliary switch with required contact.

In addition, 2 nos. PT Resin cast and dual point provided in the incoming breakers suitable for 3 phase, 50C/S system with a ratio of 6 KV/ 110 volts 200 VA, class B with necessary arrangement so that any one can be connected to the meter and relaying circuit. Symmetrical breaking capacity of the circuit breaker shall be 21.8 KA at 6.6 KV and making capacity shall be 47 KA at 6.6 KV. The short time ratio of the circuit breaker shall be 21.8 KA for 1 sec at 6.6 KV.

The circuit breaker shall be capable of carrying rated current at 45°C temp without de-rating. Continuous earth bar shall be provided for the entire length of Switch gear.

The circuit breaker shall confirm IS-2516-1877 to latest amendment.

The C. T. should not be less than 15 VA. The H.T. switch board shall comprise of 7 panels.

2.0 REMOTE CONTROL DESK FOR H.T. SWITCH GEAR AND INSTRUMENT PANEL WITH SCADA SYSTEM

The remote control desk and instrument panel combined shall be of sheet steel enclosed and floor mounted indoor type, dust and vermin proof fabricated from 2.00 mm thick CR sheet and suitable section of structural steel. It shall be suitable for tropicalised climate. The degree of protection shall be IP 44. All relays, meters, mimic, switches shall be mounted on the front. The mounting of the

Signature of the Authorised Person
of the contractor.

Page M - 1

Chief Executive Officer

Guwahati Metropolitan Development Authority

320

177

Chief Executive Officer

switches, meters, relays etc. shall be such that the switches, meters, relay indication lamps etc. for one particular section or equipment are placed in a row having symmetrical arrangements. The annunciator window with suitable point annunciation facia shall be placed suitably so as to cover with the operators easy

The control desk and instrumental panel shall hand control grip type. TNC switches, for remote operation of HT switch gears, pilot lamps, in bottom for remote operation of PDVs and Valve actuators Animators for individual equipment & machinery with selector switches, voltmeters with selector switches (Main incoming feeders) digital pressure indicators for individual pump delivery and 'common deliver manifold, suitable point temperature scanner for scanning. The individual motor bearing temperatures (DE & NIDE) motor winding temperatures (6 point), 3 phase, 3 wire power factor meters (2 nos.) of main incoming supply, digital frequency meters (2 nos) for main incoming supply, reservoir water level indicators, station flow recorder opening indication meters of the butterfly valves. The control switches, push buttons and indicating lamps shall be sequentially placed on the control switches, push buttons and indicating lamps shall be sequentially placed on the control desk and the meters, instruments etc. shall be placed on the allied instrumentation panel in addition to valves open closed/ trip indications (separate).

The instruments shall produce continuous status signals of various components as elaborated in different sections of the technical specifications, the flow recorder units shall have a flow meter, Full bore type to be installed on delivery lines after the manifold flow rate indicators, digital flow totalisor, linear chart single pen flow recorders with signal conditions, if necessary. The level measuring until shall be of capacitance type to measure the water level in sump and shall be connected to the annunciation system with low level arm and trip off pump motors at low level. The annunciation system should have suitable points annunciation facia with visual display and audio visual alarm for alarm and trip. It shall be complete with all relays along with the peak up from different relays mounted on HT & LT board. Flashers and other accessories. Accept, reset and test push buttons shall be provided, all indications shall be engraved on transparent plastic win does, those can be clearly visible when the indicating lamps are lighted.

2.01 The following indications shall be provided on the annunciation facia.

- (01) Main power incomer trip indicator under voltage incomer I & II.
- (02) Main power incomer trip indicator for over current and earth fault incomer I & II
- (03) Indication for earth fault.
- (04) Motor feeder panel trip indication for over current/earth fault protection motor.
- (05) Motor winding temperature high alarm & trip motor.
- (06) Motor bearing temperature (DE & NDE) high alarm & trip motor.
- (07) Sump level low alarm & trip.
- (08) D. C. low voltage alarms
- (09) LT incomer fault trip
- (10) Batter DC earth fault indication.

Signature of the Authorised Person
of the contractor

Page M - 2

Chief Executive Officer

Guwahati Metropolitan Development Authority

321

Chief Executive Officer
Guwahati Metropolitan Dev. Authority